

# PATENT ABSTRACTS OF JAPAN

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:

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(54) HINGE MECHANISM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a hinge mechanism having the service life and a smooth feeling and capable of setting an optional load by exceeding about 180 degrees in a turning angle of a rotary member to a fixed member.

SOLUTION: In a hinge mechanism for rotatably pivoting a rotary member on a fixed member, the hinge mechanism has a first cam 12 arranged on the fixed member, a second cam 17 being arranged on the rotary member and rotating together with the rotary member and an elastic member 11 for energizing either of at least both cams 12, 17 in the pressure contact direction, and recess/projection parts 15, 16 are arranged in a symmetrical shape of the rotational center in both cams 12, 17 in a position nonoverlapping in the circumferential direction.

LEGAL STATUS

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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## CLAIMS

[Claim(s)]

[Claim 1] The hinge device which is equipped with the first cam prepared in the holddown member, the second cam which it is prepared in a revolution member and rotated with a revolution member, and the elastic member which energizes either of both said cams in the direction of a pressure welding at least in the hinge device which supported the revolution member pivotably pivotable to the holddown member, and is characterized by to prepare the concavo-convex section of a symmetry configuration at least mostly at a duplex at both said cams in the location of a center of rotation which does not lap with a circumferencial direction.

[Translation done.]

## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the hinge device applied to a closing motion member with the need of performing angle-of-rotation accommodation of the display sections, such as a note type and a desktop PC, a cellular phone, or the closing motion lid of various machineries.

[0002]

[Description of the Prior Art] Conventionally, a revolution member is supported pivotably pivotable to a body part (holddown member), and the hinge device in which that revolution member has that location automatically held only by operating it to angle of rotation of a request of a revolution member is proposed variously that accommodation of angle of rotation of this revolution member should be made possible.

[0003] since [ among these, ] some from which elastic bodies, such as rubber, constitute a friction surface had a possibility that the inconvenience of degradation with time might arise, in the contact surface of the friction surface established in the pivot of a revolution member, and the friction surface of a holddown member -- a long-term activity --

receiving -- a stop device -- not much -- \*\*\*\*\* -- there is a thing which can be used without things and which carries out a thing thing, for example, is indicated by JP,64-59992,A. This thing is equipped with the spring means to which the pressure welding of the cam which constitutes a friction surface is carried out while it prepares the cam which has the business trip section in both a holddown member and a revolution member as a location stop means, and each cam has the two business trip sections of a symmetry configuration in a center of rotation, respectively. Drawing 8 is the development view showing the friction condition of both the cams of the example currently used abundantly at the above conventional examples, and shows the condition that angle of rotation is large in the order of (a), (b), and (c), and 71, 71, 72, and 72 are the business trip sections of a cam.

[0004]

[Problem(s) to be Solved by the Invention] However, since each cam has the two business trip sections of a symmetry configuration on the same periphery, respectively, it had a smooth feeling at the time of a revolution, but since angle of rotation would serve as a toggle load of zero - 180 degrees again as shown in the development view of drawing 8 if it surpasses 180 degrees, arbitrary load setting out was not completed (arbitrary load setting out of 180 or less degrees may not be able to be performed due to rise and fall of a cam). So, in order to surpass about 180 degrees and to consider as arbitrary load setting out, it could not but set the business trip section to one at a time at the cam, and it became slanting in this case, and became unstable actuation, and there was a problem that the smooth feeling at the time of a life and a revolution was not obtained.

[0005] This invention aims at offering the hinge device which was made in order to cancel the above troubles, has a life and a smooth feeling, and has angle of rotation [ good ] for the revolution member to a holddown member for about 180 degrees, and can perform arbitrary load setting out.

[0006]

[Means for Solving the Problem] This invention has adopted the following configurations in order to attain the object.

[0007] That is, it has the elastic member which energizes either of both [ said ] the cams in the direction of a pressure welding at least with the second cam which it is prepared in the first cam prepared in the holddown member in the hinge device with which the hinge device of this invention supported the revolution member pivotably pivotable to the holddown member, and a revolution member, and is rotated in a revolution member, and prepares [ both / said / cams ] in the location of a center of rotation which does not lap the concavo-convex section with a symmetry configuration mostly at a circumferencial direction at least at a duplex.

[0008]

[Embodiment of the Invention] Next, the gestalt (henceforth a "example") of operation of the hinge device concerning this invention is explained based on an accompanying drawing.

[0009] Drawing 1 is the decomposition perspective view showing this invention example, drawing 2 is a sectional view in the condition of having been attached in the closing motion member, and drawing 3 shows the example used for the cellular phone.

[0010] As shown in drawing 3, to a body 1, i.e., a holddown member, a lid 2, i.e., a revolution member, is supported pivotably pivotable, and an angle of rotation can rotate the revolution member 2 to a holddown member 1 from 0 times, i.e., a folding location, to

the range of about about 360 degrees.

[0011] Next, the detail of a hinge device is explained based on drawing 1 and drawing 2 . The stowage 4 which contains the closed-end cylinder-like electrode holder 3 is formed in the interior at the holddown member 1. A guide rail 5 is formed in this stowage 4, and when the advice projection 6 formed in the periphery section of said electrode holder 3 engages with this guide rail 5, the electrode holder 3 is connected with revolution impossible at the holddown member 1.

[0012] The shaft 7 which a shank 9 inserts in an electrode holder 3 through the insertion hole 10 prepared in the pars basilaris ossis occipitalis of an electrode holder 3 and by which a flange 8 is contained in contact with the bottom outside side edge side of an electrode holder 3 is attached in this electrode holder 3.

[0013] Furthermore, in the electrode holder 3, the first cam 12 which contacts the other end of the elastic member 11 (compression spring) to which an end contacts a bottom circles side edge side, and an elastic member 11 is contained. The guide slot 13 is formed in an electrode holder 3 (to inside of said advice projected part 6), the guide projection 14 is formed in the first cam 12, and the first cam 12 is contained by the electrode holder 3 at revolution impossible by engaging the guide projection 14 of the first cam 12 with the guide slot 13 of an electrode holder 3.

[0014] The concavo-convex sections 15 and 16 of the symmetry configuration of a center of rotation are formed in the location with which it does not lap at a circumferencial direction in the field which touches the elastic member 11 of the first cam 12, and the field of an opposite hand, and the cam side is constituted. That is, the concavo-convex section 16 was formed in the periphery side, and the concavo-convex section 15 is formed in the inner circumference side. The second cam 17 which it is fixed to the revolution member 2 to the cam side of the first cam 12, and is rotated with the revolution member 2 has contacted.

[0015] The stowage 18 which contains the second cam 17 is formed in the revolution member 2, and the key way 19 is formed in this stowage 18. Moreover, he forms the projection 20 in the second cam 17 at the periphery section, and is trying to rotate the second cam 17 with the revolution member 2 by engaging this projection 20 with the key way 19 of a stowage 18. This second cam 17 is connected with said shaft 7 through the mounting screw 21.

[0016] It is the location which does not lap mutually the concavo-convex sections 22 and 23 of the symmetry configuration of a center of rotation with the first cam 12 cam side of the second cam 17, and the \*\*\*\*ing field at a circumferencial direction, and it forms on a concentric circle and the cam side is constituted. Drawing 4 is what showed this second cam 12 as a top view, formed the concavo-convex section 23 in the periphery side, and has formed the concavo-convex section 22 in the inner circumference side. This periphery side irregularity section 23 in the counterclockwise direction (circumference of a clock and objection) The lifting slant surface part 31, the flat-surface section 32, the lifting slant surface part 33, the lifting slant surface part 34, the flat-surface section 35 (top face), pass a stage -- pass the flat-surface section 36 (base), the lifting slant surface part 37, the flat-surface section 38, the downward slant surface part 39, the flat-surface section 40 (base), the lifting slant surface part 41, the flat-surface section 42 (top face), and a stage -- the flat-surface section (base) 43 -- then, it returns to the original lifting slant surface part 31. The inner circumference side irregularity section 22 in the counterclockwise direction Moreover, the lifting slant surface part 51, the flat-surface section 52, the lifting slant

surface part 53, the lifting slant surface part 54, the flat-surface section 55 (top face), It continues with the flat-surface section (base) 63 through the flat-surface section 56 (base), the lifting slant surface part 57, the flat-surface section 58, the downward slant surface part 59, the flat-surface section 60 (base), the lifting slant surface part 61, the flat-surface section 62, and a stage through a stage, and returns to the original slant surface part 51 (refer to drawing 5 mentioned later).

[0017] That is, the periphery side irregularity section 16 of the first cam 12 and the periphery side irregularity section 23 of the second cam will carry out a pressure welding in the state of friction of the first cam 12 and the second cam 17, and the inner circumference side irregularity section 15 of the first cam and the inner circumference side irregularity section 22 of the second cam will carry out a pressure welding.

Therefore, since the concavo-convex sections 15, 16, 22, and 23 are in both sides to a revolving shaft, respectively, in order that the load which does not become slanting in the state of a pressure welding, and deflection requires for a shaft may decrease, said first cam 12 and this second cam 17 become long lasting while operating smoothly.

[0018] In addition, it escapes in the periphery section of the second cam 17, and the clip 24 for stops is attached. Since a stop should just be escaped and carried out, the E ring of a ready-made article is sufficient instead of this clip 24.

[0019] Moreover, in order to improve an appearance, the cover cap 25 was arranged in the shank 9 and opposite hand of a shaft 7, but if it does not care about an appearance, you may not be.

[0020] Next, overall actuation (fluctuation of an operating physical force) of the above-mentioned example is explained.

[0021] It is the development view (an upper case is the friction condition of the concavo-convex sections 16 and 23, and the lower berth is the friction condition of the concavo-convex sections 15 and 22) in which drawing 7 shows the friction condition of the first cam 12 and the second cam 17 from drawing 5, and drawing 5, drawing 6, and the condition that angle of rotation is large in the order of drawing 7 are shown. First, the condition which shows in drawing 5 is in a condition in case the revolution member 2 takes a fold-up location (angle of rotation is 0 times) to a holddown member 1. Up to the location (it rotated) which angle of rotation opened about 10 degrees, the force (closing force made like) which is going to return to the location of 0 times commits the revolution member 2 from this folding location by the lifting slant surface parts 31 and 51 of the energization force of an elastic member 11, and the concavo-convex sections 22 and 23.

[0022] Next, since the flat-surface sections 32 and 53 will continue to the location rotated about 120 degrees (reference of drawing 6) if the revolution member 2 is rotated further, the energization force of an elastic member 11 and the frictional force of both the cam side change uniformly. That is, about 10 to 120 degrees are in the condition which can be held at the fleece top by the flat-surface sections 32 and 52. If the revolution member 2 rotates about 120 degrees, a cam will reach Yamabe, the concavo-convex sections 15, 16, 22, and 23, and since a suitable operating physical force is needed by the steep lifting slant surface parts 33 and 53 of a cam when you are going to make it rotate 120 degrees or more, an include angle required for the call in a cellular phone at about 120 degrees can be held.

[0023] Furthermore, if the revolution member 2 is rotated, the crowning of Yamabe, each concavo-convex sections 15, 16, 22, and 23, will be reached, and it will amount to 180

degrees soon. Since the concavo-convex sections 15, 16, 22, and 23 are formed in the location which does not lap with the symmetry configuration of a center of rotation at a circumferential direction here, even if angle of rotation surpasses 180 degrees, as shown in drawing 7, arbitrary load setting out can be performed. Moreover, if the downward slant surface parts 39 and 59 are arrived at, the force (force which it is going to open) in which it has bounded will work. As mentioned above, the force which it is going to close according [ the hinge device of this invention ] to \*\* lifting slant surface part 31 grade, \*\* the force held at the fleece top by flat-surface section 32 grade, and \*\* -- the force (it may replace with a rapid lifting slant surface part, a crevice may be prepared, and a required include angle may be held) of holding the required include angle by rapid lifting slant surface part 33 grade -- \*\* It is effective in the force (force which it is going to open) by downward slant surface part 39 grade in which it has bounded, and these [ all ].

[0024] In addition, in the above-mentioned example, although the concavo-convex sections 15, 16, 22, and 23 were formed in the location which does not lap with a circumferential direction in a symmetry configuration to a revolving shaft at the duplex, that what is necessary is just more than a duplex, they may be formed in Mie or may be formed in four-fold.

[0025] Moreover, although the first cam 12 was formed in the holddown member 1 in the above-mentioned example and the second cam 17 was formed in the revolution member 2, since what is necessary is just to rotate relatively, it cannot be overemphasized that you may arrange in reverse.

[0026]

[Effect of the Invention] Since this invention is constituted as mentioned above, it does so the effectiveness indicated below.

[0027] Since according to invention of claim 1 the concavo-convex section of the symmetry configuration of a center of rotation was formed in the location which does not lap with a circumferential direction, the cam side was constituted and the load which deflection requires for a shaft can be reduced, the hinge device which has a life and a smooth feeling, and has angle of rotation [ good ] for the revolution member to a holddown member for about 180 degrees, and can perform arbitrary load setting out can be offered.

[Translation done.]

## TECHNICAL FIELD

[Field of the Invention] This invention relates to the hinge device applied to a closing motion member with the need of performing angle-of-rotation accommodation of the display sections, such as a note type and a desktop PC, a cellular phone, or the closing motion lid of various machineries.

[Translation done.]

## PRIOR ART

[Description of the Prior Art] Conventionally, a rotation member is supported pivotably pivotable to a body part (holddown member), and the hinge device in which that rotation member has that location automatically held only by operating it to angle of rotation of a request of a rotation member is proposed variously that accommodation of angle of rotation of this rotation member should be made possible.

[0003] since [ among these, ] some from which elastic bodies, such as rubber, constitute a friction surface had a possibility that un-arranging [ of degradation with time ] might arise, in the contact surface of the friction surface established in the pivot of a rotation member, and the friction surface of a holddown member -- long-term use -- receiving -- a stop device -- not much -- \*\*\*\*\* -- there is a thing which can be used without things and which carries out a thing thing, for example, is indicated by JP,64-59992,A. This thing is equipped with the spring means to which the pressure welding of the cam which constitutes a friction surface is carried out while it prepares the cam which has the business trip section in both a holddown member and a rotation member as a location stop means, and each cam has the two business trip sections of a symmetry configuration in the center of rotation, respectively. Drawing 8 is the development view showing the friction condition of both the cams of the example currently used abundantly at the above conventional examples, and shows the condition that angle of rotation is large in the order of (a), (b), and (c), and 71, 71, 72, and 72 are the business trip sections of a cam.

## EFFECT OF THE INVENTION

[Effect of the Invention] Since this invention is constituted as mentioned above, it does so the effectiveness indicated below.

[0027] Since according to invention of claim 1 the concave heights of the symmetry configuration of the center of rotation were formed in the location which does not lap with a circumferencial direction, the cam side was constituted and the load which deflection requires for a shaft can be reduced, the hinge device which has a life and a smooth feeling, and has angle of rotation [ good ] for the rotation member to a holddown member for about 180 degrees, and can perform arbitrary load setup can be offered.

## TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since each cam has the two business

trip sections of a symmetry configuration on the same periphery, respectively, it had a smooth feeling at the time of a revolution, but since angle of rotation would serve as a toggle load of zero - 180 degrees again as shown in the development view of drawing 8 if it surpasses 180 degrees, arbitrary load setting out was not completed (arbitrary load setting out of 180 or less degrees may not be able to be performed due to rise and fall of a cam). So, in order to surpass about 180 degrees and to consider as arbitrary load setting out, it could not but set the business trip section to one at a time at the cam, and it became slanting in this case, and became unstable actuation, and there was a problem that the smooth feeling at the time of a life and a revolution was not obtained.

[0005] This invention aims at offering the hinge device which was made in order to cancel the above troubles, has a life and a smooth feeling, and has angle of rotation [ good ] for the revolution member to a holddown member for about 180 degrees, and can perform arbitrary load setting out.

## MEANS

[Means for Solving the Problem] This invention has adopted the following configurations in order to attain the object.

[0007] That is, it has the elastic member which energizes either of both [ said ] the cams in the direction of a pressure welding at least with the second cam which it is prepared in the first cam prepared in the holddown member in the hinge device with which the hinge device of this invention supported the revolution member pivotably pivotable to the holddown member, and a revolution member, and is rotated in a revolution member, and prepares [ both / said / cams ] in the location of a center of rotation which does not lap the concavo-convex section with a symmetry configuration mostly at a circumferencial direction at least at a duplex.

[0008]

[Embodiment of the Invention] Next, the gestalt of operation of the hinge device concerning this invention (following)

## EXAMPLE

a "example" -- saying -- it explains based on an accompanying drawing.

[0009] Drawing 1 is the decomposition perspective view showing this invention example, drawing 2 is a sectional view in the condition of having been attached in the closing motion member, and drawing 3 shows the example used for the cellular phone.

[0010] As shown in drawing 3 , to a body 1, i.e., a holddown member, a lid 2, i.e., a revolution member, is supported pivotably pivotable, and an angle of rotation can rotate the revolution member 2 to a holddown member 1 from 0 times, i.e., a folding location, to the range of about about 360 degrees.

[0011] Next, the detail of a hinge device is explained based on drawing 1 and drawing 2 .



The stowage 4 which contains the closed-end cylinder-like electrode holder 3 is formed in the interior at the holddown member 1. A guide rail 5 is formed in this stowage 4, and when the advice projection 6 formed in the periphery section of said electrode holder 3 engages with this guide rail 5, the electrode holder 3 is connected with revolution impossible at the holddown member 1.

[0012] The shaft 7 which a shank 9 inserts in an electrode holder 3 through the insertion hole 10 prepared in the pars basilaris ossis occipitalis of an electrode holder 3 and by which a flange 8 is contained in contact with the bottom outside side edge side of an electrode holder 3 is attached in this electrode holder 3.

[0013] Furthermore, in the electrode holder 3, the first cam 12 which contacts the other end of the elastic member 11 (compression spring) to which an end contacts a bottom circles side edge side, and an elastic member 11 is contained. The guide slot 13 is formed in an electrode holder 3 (to inside of said advice projected part 6), the guide projection 14 is formed in the first cam 12, and the first cam 12 is contained by the electrode holder 3 at revolution impossible by engaging the guide projection 14 of the first cam 12 with the guide slot 13 of an electrode holder 3.

[0014] The concavo-convex sections 15 and 16 of the symmetry configuration of a center of rotation are formed in the location with which it does not lap at a circumferential direction in the field which touches the elastic member 11 of the first cam 12, and the field of an opposite hand, and the cam side is constituted. That is, the concavo-convex section 16 was formed in the periphery side, and the concavo-convex section 15 is formed in the inner circumference side. The second cam 17 which it is fixed to the revolution member 2 to the cam side of the first cam 12, and is rotated with the revolution member 2 has contacted.

[0015] The stowage 18 which contains the second cam 17 is formed in the revolution member 2, and the key way 19 is formed in this stowage 18. Moreover, he forms the projection 20 in the second cam 17 at the periphery section, and is trying to rotate the second cam 17 with the revolution member 2 by engaging this projection 20 with the key way 19 of a stowage 18. This second cam 17 is connected with said shaft 7 through the mounting screw 21.

[0016] It is the location which does not lap mutually the concavo-convex sections 22 and 23 of the symmetry configuration of a center of rotation with the first cam 12 cam side of the second cam 17, and the \*\*\*\*ing field at a circumferential direction, and it forms on a concentric circle and the cam side is constituted. Drawing 4 is what showed this second cam 12 as a top view, formed the concavo-convex section 23 in the periphery side, and has formed the concavo-convex section 22 in the inner circumference side. This periphery side irregularity section 23 in the counterclockwise direction (circumference of a clock and objection) The lifting slant surface part 31, the flat-surface section 32, the lifting slant surface part 33, the lifting slant surface part 34, the flat-surface section 35 (top face), pass a stage -- pass the flat-surface section 36 (base), the lifting slant surface part 37, the flat-surface section 38, the downward slant surface part 39, the flat-surface section 40 (base), the lifting slant surface part 41, the flat-surface section 42 (top face), and a stage -- the flat-surface section (base) 43 -- then, it returns to the original lifting slant surface part 31. The inner circumference side irregularity section 22 in the counterclockwise direction Moreover, the lifting slant surface part 51, the flat-surface section 52, the lifting slant surface part 53, the lifting slant surface part 54, the flat-surface section 55 (top face), It continues with the flat-surface section (base) 63 through the flat-surface section 56 (base),

the lifting slant surface part 57, the flat-surface section 58, the downward slant surface part 59, the flat-surface section 60 (base), the lifting slant surface part 61, the flat-surface section 62, and a stage through a stage, and returns to the original slant surface part 51 (refer to drawing 5 mentioned later).

[0017] That is, the periphery side irregularity section 16 of the first cam 12 and the periphery side irregularity section 23 of the second cam will carry out a pressure welding in the state of friction of the first cam 12 and the second cam 17, and the inner circumference side irregularity section 15 of the first cam and the inner circumference side irregularity section 22 of the second cam will carry out a pressure welding.

Therefore, since the concavo-convex sections 15, 16, 22, and 23 are in both sides to a revolving shaft, respectively, in order that the load which does not become slanting in the state of a pressure welding, and deflection requires for a shaft may decrease, said first cam 12 and this second cam 17 become long lasting while operating smoothly.

[0018] In addition, it escapes in the periphery section of the second cam 17, and the clip 24 for stops is attached. Since a stop should just be escaped and carried out, the E ring of a ready-made article is sufficient instead of this clip 24.

[0019] Moreover, in order to improve an appearance, the cover cap 25 was arranged in the shank 9 and opposite hand of a shaft 7, but if it does not care about an appearance, you may not be.

[0020] Next, overall actuation (fluctuation of an operating physical force) of the above-mentioned example is explained.

[0021] It is the development view (an upper case is the friction condition of the concavo-convex sections 16 and 23, and the lower berth is the friction condition of the concavo-convex sections 15 and 22) in which drawing 7 shows the friction condition of the first cam 12 and the second cam 17 from drawing 5, and drawing 5, drawing 6, and the condition that angle of rotation is large in the order of drawing 7 are shown. First, the condition which shows in drawing 5 is in a condition in case the revolution member 2 takes a fold-up location (angle of rotation is 0 times) to a holddown member 1. Up to the location (it rotated) which angle of rotation opened about 10 degrees, the force (closing force made like) which is going to return to the location of 0 times commits the revolution member 2 from this folding location by the lifting slant surface parts 31 and 51 of the energization force of an elastic member 11, and the concavo-convex sections 22 and 23.

[0022] Next, since the flat-surface sections 32 and 53 will continue to the location rotated about 120 degrees (reference of drawing 6) if the revolution member 2 is rotated further, the energization force of an elastic member 11 and the frictional force of both the cam side change uniformly. That is, about 10 to 120 degrees are in the condition which can be held at the fleece top by the flat-surface sections 32 and 52. If the revolution member 2 rotates about 120 degrees, a cam will reach Yamabe, the concavo-convex sections 15, 16, 22, and 23, and since a suitable operating physical force is needed by the steep lifting slant surface parts 33 and 53 of a cam when you are going to make it rotate 120 degrees or more, an include angle required for the call in a cellular phone at about 120 degrees can be held.

[0023] Furthermore, if the revolution member 2 is rotated, the crowning of Yamabe, each concavo-convex sections 15, 16, 22, and 23, will be reached, and it will amount to 180 degrees soon. Since the concavo-convex sections 15, 16, 22, and 23 are formed in the location which does not lap with the symmetry configuration of a center of rotation at a

circumferential direction here, even if angle of rotation surpasses 180 degrees, as shown in drawing 7 , arbitrary load setting out can be performed. Moreover, if the downward slant surface parts 39 and 59 are arrived at, the force (force which it is going to open) in which it has bounded will work. As mentioned above, the force which it is going to close according [ the hinge device of this invention ] to \*\* lifting slant surface part 31 grade, \*\* the force held at the fleece top by flat-surface section 32 grade, and \*\* -- the force (it may replace with a rapid lifting slant surface part, a crevice may be prepared, and a required include angle may be held) of holding the required include angle by rapid lifting slant surface part 33 grade -- \*\* It is effective in the force (force which it is going to open) by downward slant surface part 39 grade in which it has bounded, and these [ all ].

[0024] In addition, in the above-mentioned example, although the concavo-convex sections 15, 16, 22, and 23 were formed in the location which does not lap with a circumferential direction in a symmetry configuration to a revolving shaft at the duplex, that what is necessary is just more than a duplex, they may be formed in Mie or may be formed in four-fold.

[0025] Moreover, although the first cam 12 was formed in the holddown member 1 in the above-mentioned example and the second cam 17 was formed in the revolution member 2, since what is necessary is just to rotate relatively, it cannot be overemphasized that you may arrange in reverse.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the decomposition perspective view showing this invention example.

[Drawing 2] It is the sectional view showing this invention example.

[Drawing 3] It is the front view showing the example of an activity of this invention example.

[Drawing 4] It is the top view showing the second cam of this invention example.

[Drawing 5] Angle of rotation of this invention example is the development view showing the friction condition of the cam which is 0 times.

[Drawing 6] Angle of rotation of this invention example is the development view showing the friction condition of the cam which is 120 degrees.

[Drawing 7] Angle of rotation of this invention example is the development view showing the friction condition of the cam which is 230 degrees.

[Drawing 8] It is the development view showing the friction condition of the cam of the conventional example.

[Description of Notations]

1 Holddown Member

2 Revolution Member

11 Elastic Member

12 First Cam

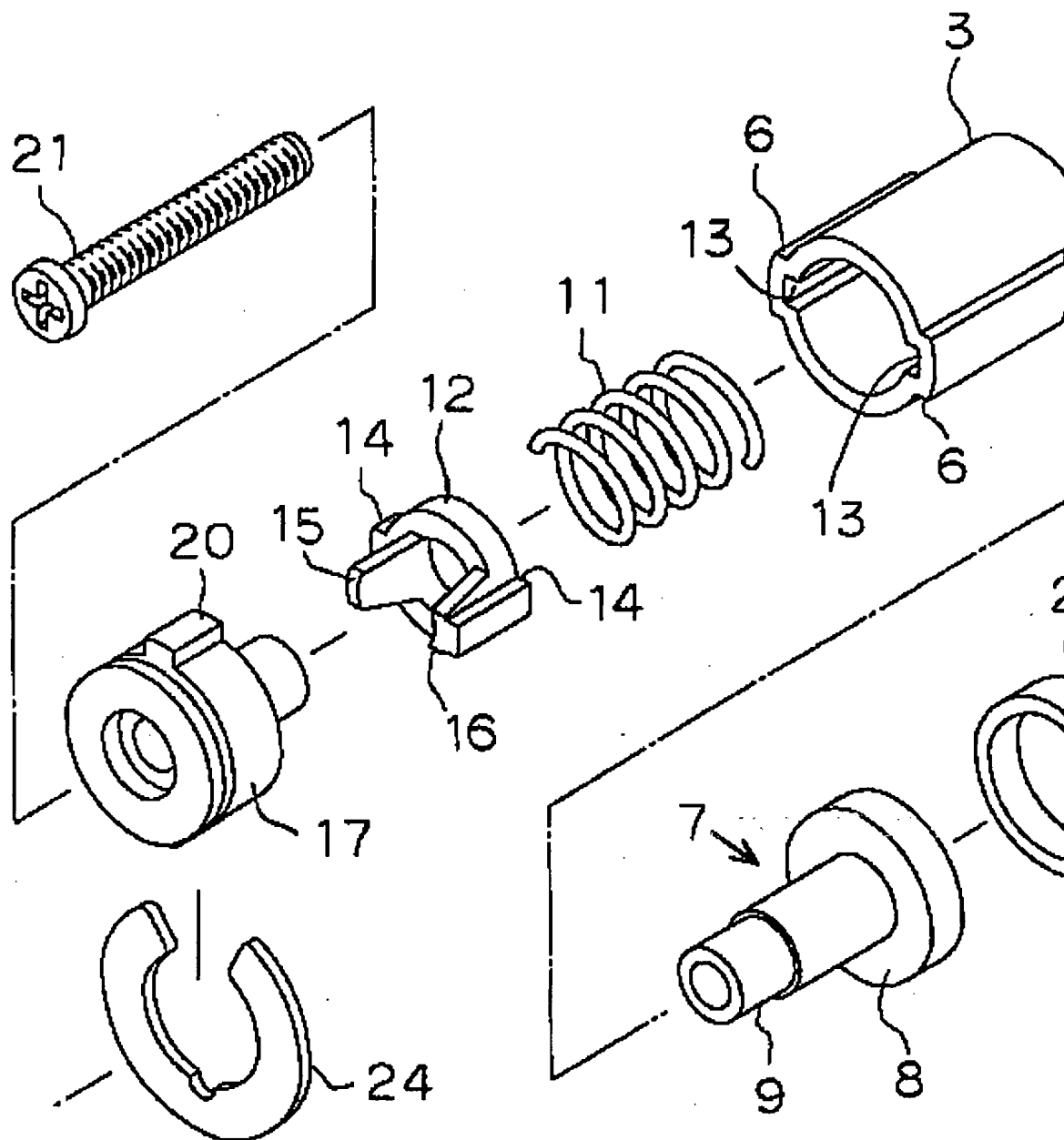
15 Concavo-convex Section

16 Concavo-convex Section

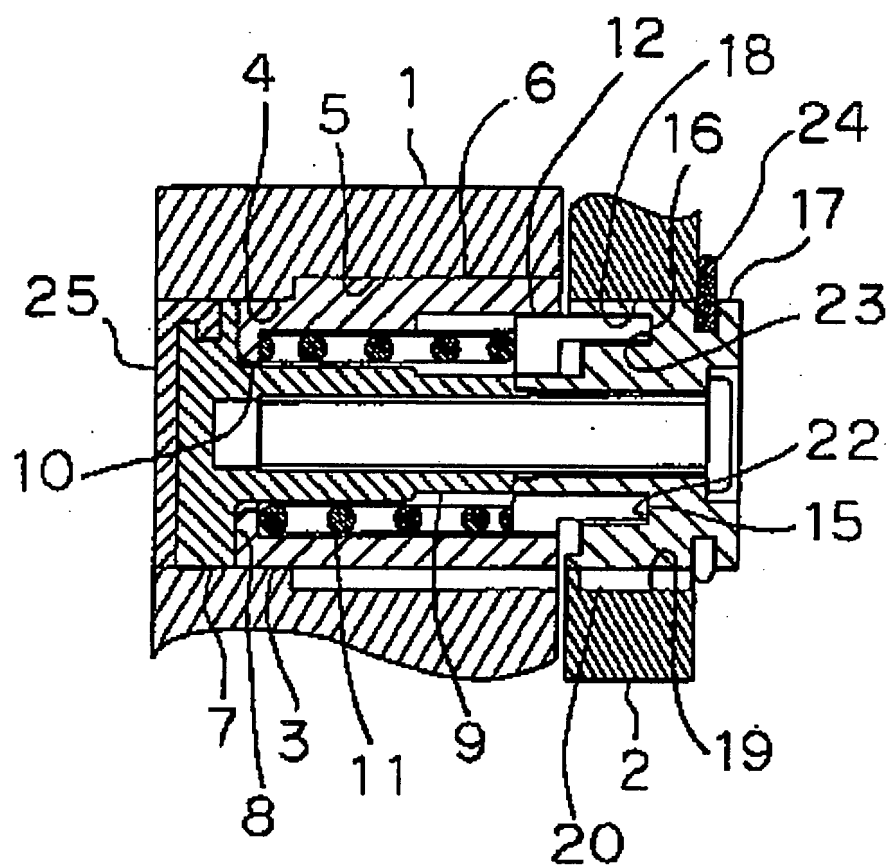
17 Second Cam

22 Concavo-convex Section  
23 Concavo-convex Section

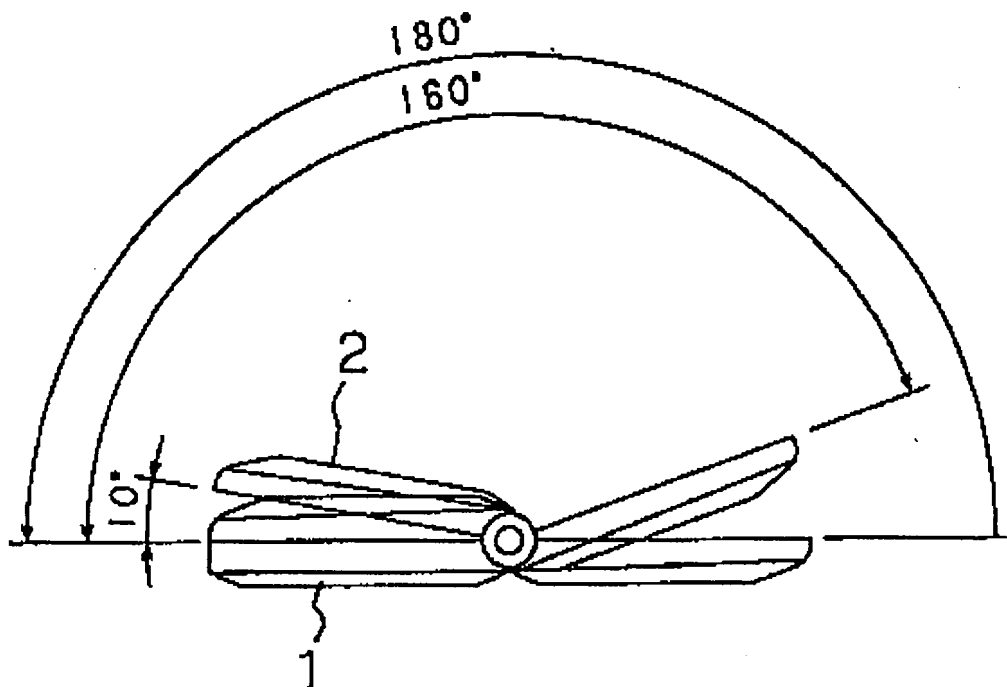
[Drawing 1]



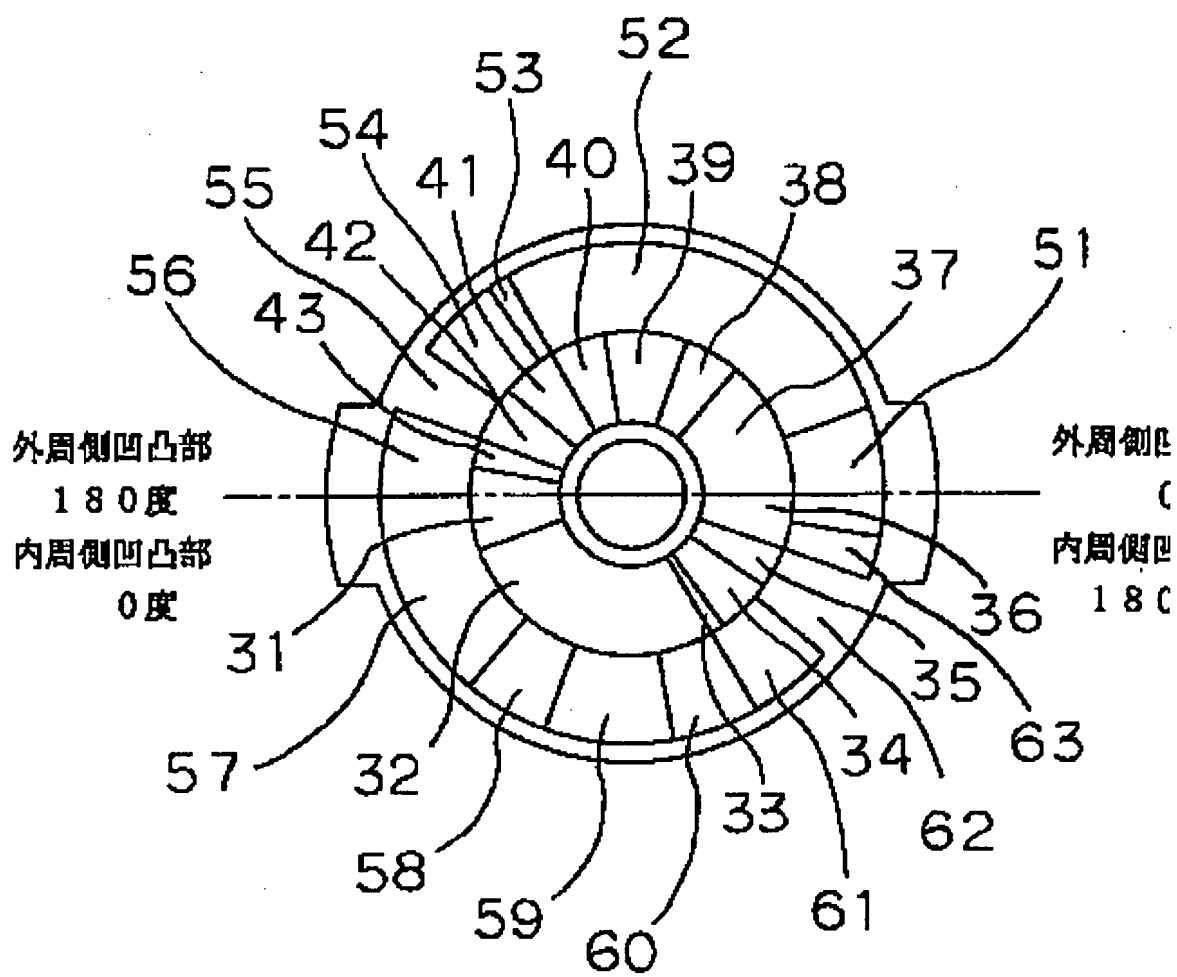
[Drawing 2]



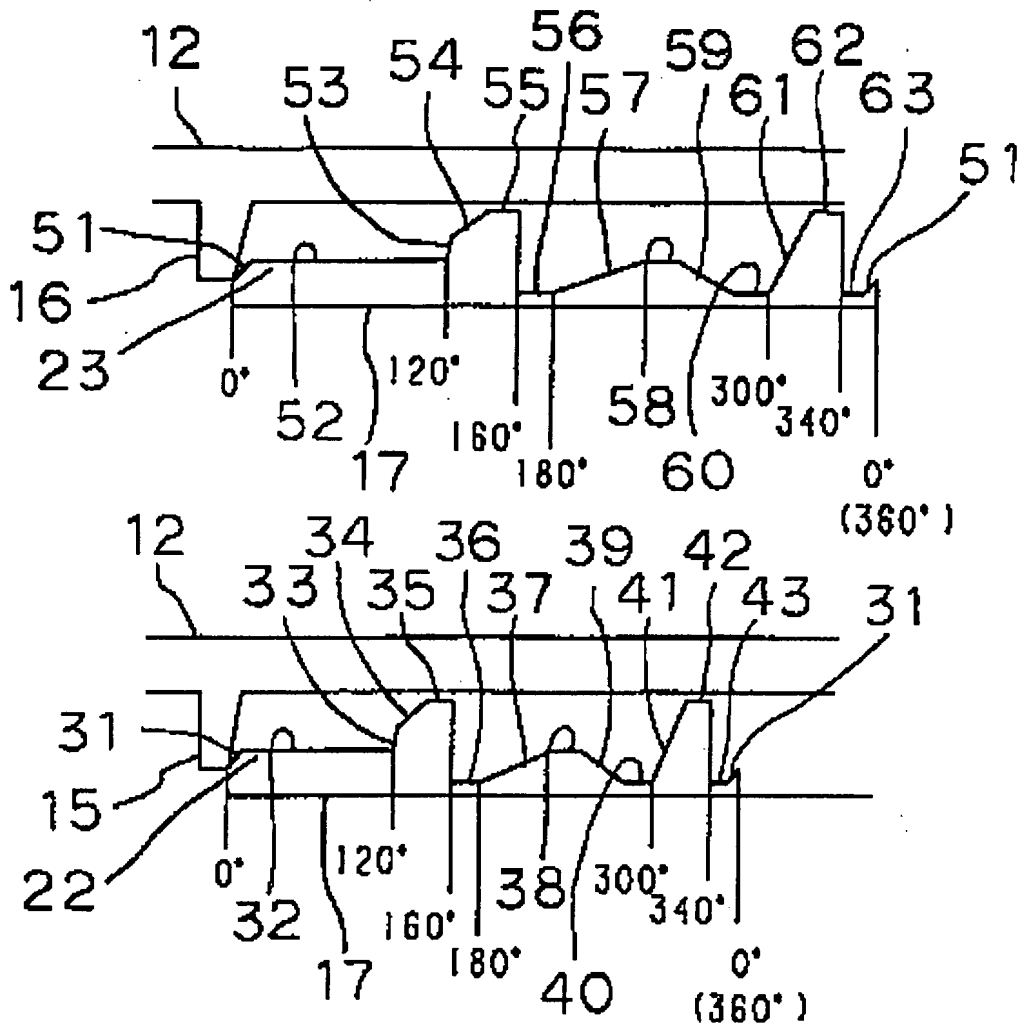
[Drawing 3]



[Drawing 4]

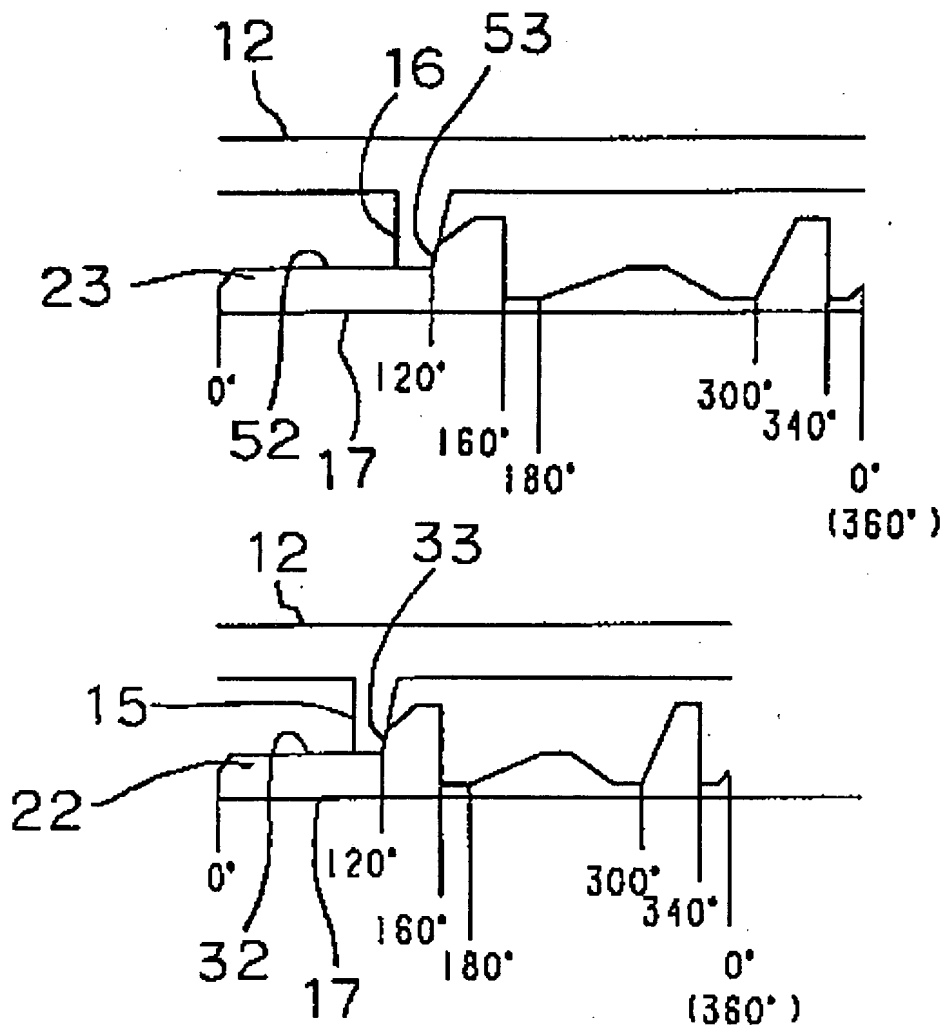


[Drawing 5]

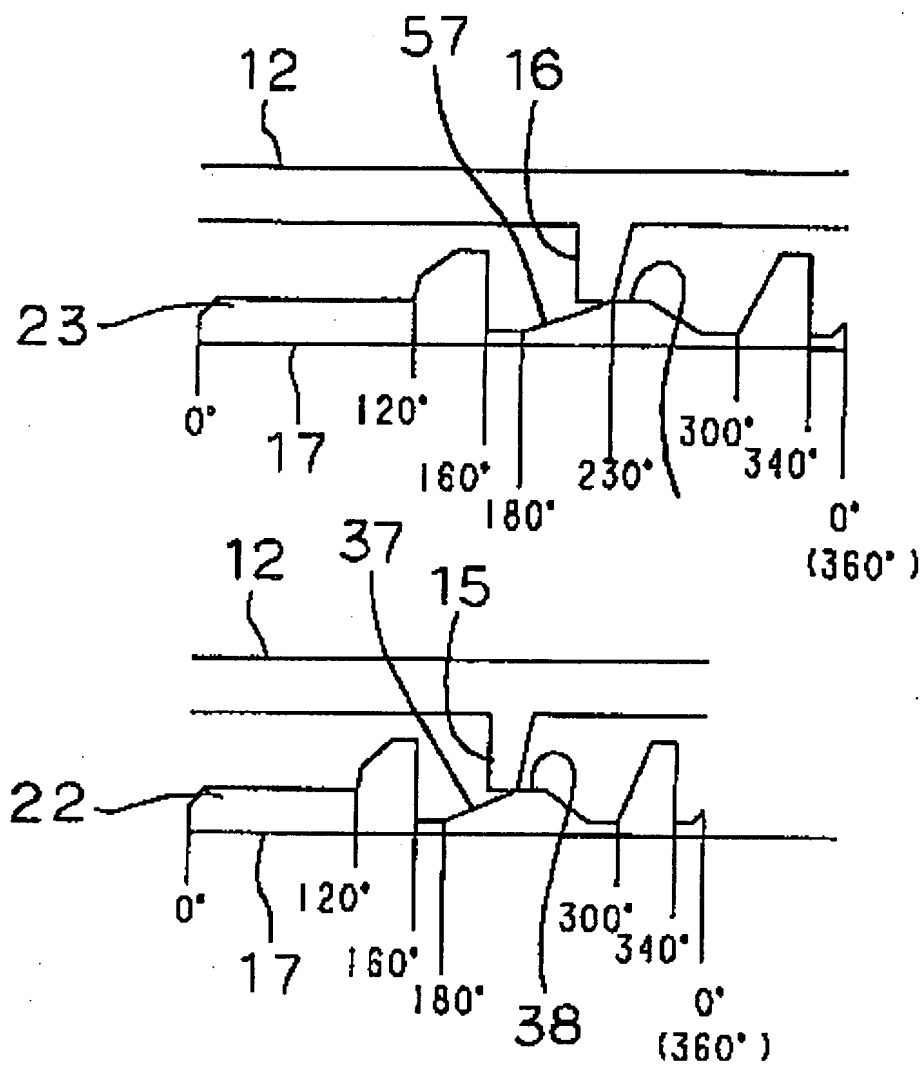


[Drawing 6]

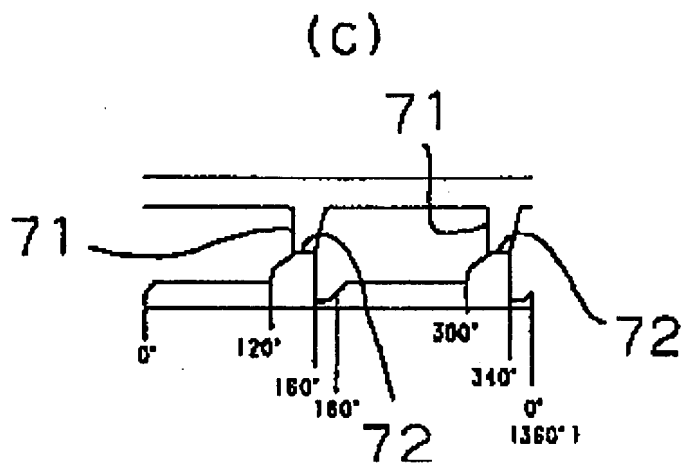
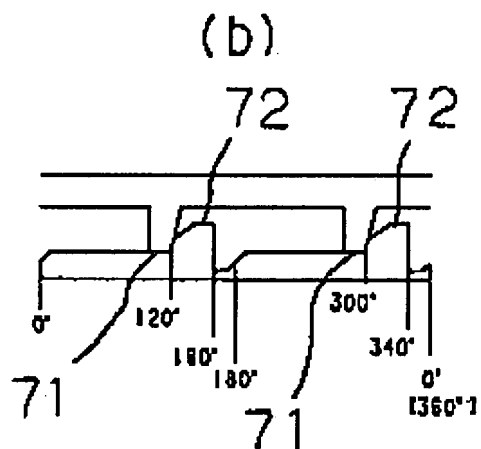
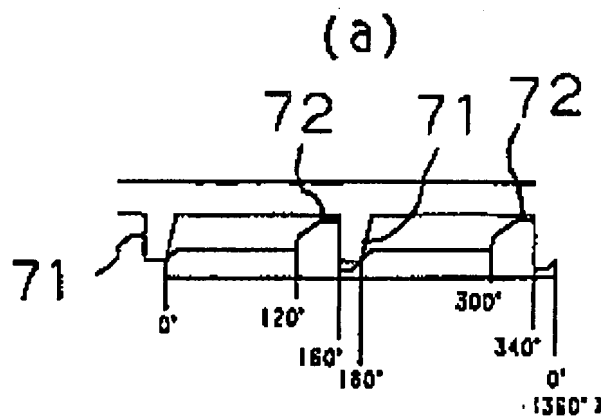




[Drawing 7]



[Drawing 8]



## PATENT ABSTRACTS OF JAPAN

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OYAMA JUNSHI

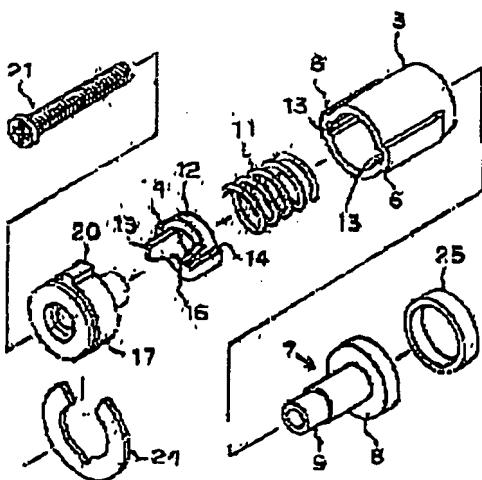
KOSHI KAZUYA

### (54) HINGE MECHANISM

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a hinge mechanism having the service life and a smooth feeling and capable of setting an optional load by exceeding about 180 degrees in a turning angle of a rotary member to a fixed member.

**SOLUTION:** In a hinge mechanism for rotatably pivoting a rotary member on a fixed member, the hinge mechanism has a first cam 12 arranged on the fixed member, a second cam 17 being arranged on the rotary member and rotating together with the rotary member and an elastic member 11 for energizing either of at least both cams 12, 17 in the pressure contact



direction, and recess/projection parts 15, 16 are arranged in a symmetrical shape of

the rotational center in both cams 12, 17 in a position nonoverlapping in the circumferential direction.

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## CLAIMS

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### [Claim(s)]

[Claim 1] The hinge device which is equipped with the first cam prepared in the holddown member, the second cam which it is prepared in a rotation member and rotated with a rotation member, and the elastic member which energizes either of both said cams in the direction of a pressure welding at least in the hinge device which supported the rotation member pivotably pivotable to the holddown member, and is characterized by to prepare the concave heights of a symmetry configuration at least mostly at a duplex at both said cams in the location of the center of rotation which does not lap with a circumferencial direction.

## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the decomposition perspective view showing this invention example.

[Drawing 2] It is the sectional view showing this invention example.

[Drawing 3] It is the front view showing the example of use of this invention example.

[Drawing 4] It is the top view showing the second cam of this invention example.

[Drawing 5] Angle of rotation of this invention example is the development view showing the friction condition of the cam which is 0 times.

[Drawing 6] Angle of rotation of this invention example is the development view showing the friction condition of the cam which is 120 degrees.

[Drawing 7] Angle of rotation of this invention example is the development view showing the friction condition of the cam which is 230 degrees.

[Drawing 8] It is the development view showing the friction condition of the cam of the conventional example.

### [Description of Notations]

1 Holddown Member

2 Rotation Member

11 Elastic Member

12 First Cam

15 Concave Heights

16 Concave Heights

17 Second Cam

22 Concave Heights

23 Concave Heights

(19)日本国特許庁 (J P)

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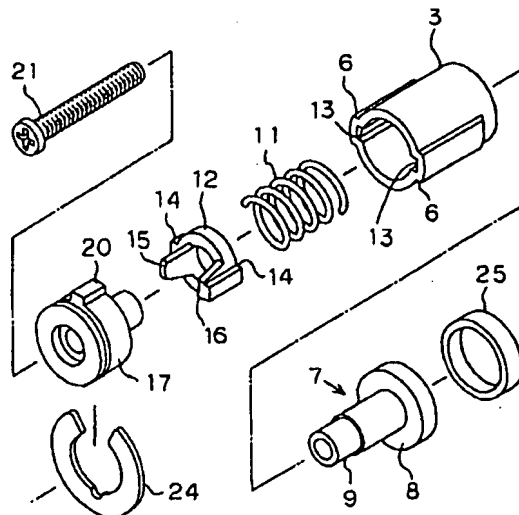
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(54)【発明の名称】 ヒンジ機構

(57)【要約】

【課題】 寿命とスムーズ感があり、固定部材に対する回転部材の回転角度が約180度をこえて任意な荷重設定ができるヒンジ機構を提供すること。

【解決手段】 固定部材1に対し回転部材2を回転可能に枢支したヒンジ機構において、固定部材1に設けられた第一カム12と、回転部材2に設けられ、回転部材2とともに回転する第二カム17と、少なくとも前記両カム12、17のいずれかを圧接方向に付勢する弾性部材11とを備え、前記両カム12、17には回転中心の対称形状に凹凸部15、16、22、23を円周方向に重ならない位置に設けた。



【特許請求の範囲】

【請求項1】 固定部材に対し回転部材を回転可能に枢支したヒンジ機構において、固定部材に設けられた第一カムと、回転部材に設けられ、回転部材とともに回転する第二カムと、少なくとも前記両カムのいずれかを圧接方向に付勢する弾性部材とを備え、前記両カムには回転中心のほぼ対称形状の凹凸部を円周方向に重ならない位置に少なくとも二重に設けたことを特徴とするヒンジ機構。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明はノートタイプやデスクトップパソコン等のディスプレイ部、携帯電話あるいは各種機械装置の開閉蓋等の回転角度調節を行う必要のある開閉部材に適用されるヒンジ機構に関する。

【0002】

【従来の技術】 従来より、本体部分（固定部材）に対して回転部材が回転可能に枢支され、この回転部材の回転角度の調節を可能とすべく、回転部材を所望の回転角度まで操作するだけで自動的にその回転部材がその位置を保持されるようなヒンジ機構が種々提案されている。

【0003】 このうち回転部材の枢軸に設けられた摩擦面と固定部材の摩擦面との接触面において、ゴム等の弾性体が摩擦面を構成するものは経時的劣化の不都合が生じる恐れがあったため、長期的使用に対して係止機構があまり劣えることなく使用できるものものとして例えば特開昭64-59992号に記載されているものがある。このものは、位置係止手段として固定部材と回転部材の両方に出張部を有するカムを設けるとともに摩擦面を構成するカムを圧接させるパネ手段とを備えていて、各カムは、それぞれ回転中心に対称形状の出張部を2つ有するものである。図8は上記のような従来例に多用されている例の両カムの摩擦状態を示す展開図であり、

(a)、(b)、(c)の順で回転角度が大きくなっている状態を示しており、71、71'、72、72'はカムの出張部である。

【0004】

【発明が解決しようとする課題】 しかしながら、各カムは同一円周上に対称形状の出張部をそれぞれ2つ有するものであることから、回転時のスムーズ感があるが、回転角度が180度をこえると、図8の展開図のように再び0度～180度のトルク荷重となるため、任意な荷重設定ができなかった（カムの上り下りの関係で180度以下の任意な荷重設定ができない場合もある）。そこで、約180度をこえて任意な荷重設定とするために、出張部をカムに1つずつとするしかなく、この場合は斜めになって不安定な動作となり寿命と回転時のスムーズ感が得られないという問題があった。

【0005】 本発明は、上記のような問題点を解消するためなされたもので、寿命とスムーズ感があり、かつ固

定部材に対する回転部材の回転角度が約180度をこえて任意な荷重設定ができるヒンジ機構を提供することを目的とする。

【0006】

【課題を解決するための手段】 本発明はその目的を達成するため次のような構成を採用している。

【0007】 つまり、本発明のヒンジ機構は固定部材に対し回転部材を回転可能に枢支したヒンジ機構において、固定部材に設けられた第一カムと、回転部材に設けられ、回転部材とともに回転する第二カムと、少なくとも前記両カムのいずれかを圧接方向に付勢する弾性部材とを備え、前記両カムには回転中心のほぼ対称形状に凹凸部を円周方向に重ならない位置に少なくとも二重に設けたものである。

【0008】

【発明の実施の形態】 次に本発明に係わるヒンジ機構の実施の形態（以下、「実施例」という）を添付図面に基づいて説明する。

【0009】 図1は本発明実施例を示す分解斜視図であり、図2は開閉部材に取り付けられた状態の断面図であり、図3は携帯電話に使用した例を示す。

【0010】 図3に示すように、本体すなわち固定部材1に対して、蓋体すなわち回転部材2が回転可能に枢支され、回転部材2は固定部材1に対して回転角が0度すなわち折り畳み位置から、約360度近くの範囲まで回転することができる。

【0011】 次に図1、図2に基づいてヒンジ機構の詳細について説明する。固定部材1には内部に有底円筒状のホルダー3を収納する収納部4が形成されている。この収納部4に案内溝5が設けられ、この案内溝5に前記ホルダー3の外周部に形成した案内突起6に係合することにより、固定部材1にホルダー3が回転不能に連結されている。

【0012】 このホルダー3にはフランジ部8がホルダー3の底部外側端面に当接し軸部9がホルダー3の底部に設けた挿通孔10を通してホルダー3に挿入し収納されるシャフト7を取り付けている。

【0013】 さらに、ホルダー3には底部内側端面に一端が当接する弾性部材11（圧縮パネ）と弾性部材11の他端に当接する第一カム12を収納している。ホルダー3には（前記案内突起6の内側に）ガイド溝13を形成していて、第一カム12にガイド突起14を設けて、第一カム12のガイド突起14をホルダー3のガイド溝13に係合することにより第一カム12がホルダー3に回転不能に収納される。

【0014】 第一カム12の弾性部材11と接する面と反対側の面には回転中心の対称形状の凹凸部15、16を円周方向に重ならない位置に設けてカム面を構成している。つまり、外周側に凹凸部16を設け、内周側に凹凸部15を設けている。第一カム12のカム面に対し回



転部材2に固定され回転部材2とともに回転する第二カム17が当接している。

【0015】回転部材2には第二カム17を収納する収納部18が形成されていて、この収納部18にキー溝19が形成されている。また、第二カム17には外周部に突起20を形成していて、この突起20を収納部18のキー溝19に係合することにより第二カム17を回転部材2とともに回転するようにしている。この第二カム17は取付ネジ21を介して前記シャフト7と連結している。

【0016】第二カム17の第一カム12カム面と摺接する面には回転中心の対称形状の凹凸部22、23を円周方向に互いに重ならない位置でかつ同心円上に形成してカム面を構成している。図4はこの第二カム12を平面図として示したもので、外周側に凹凸部23を設け、内周側に凹凸部22を設けている。この外周側凹凸部23は、左回り（時計と反対回り）に上昇斜面部31、平面部32、上昇斜面部33、上昇斜面部34、平面部35（頂面）、段を経て平面部36（底面）、上昇斜面部37、平面部38、下降斜面部39、平面部40（底面）、上昇斜面部41、平面部42（頂面）、段を経て平面部（底面）43と続いて、元の上昇斜面部31に戻る。また、内周側凹凸部22は、左回りに上昇斜面部51、平面部52、上昇斜面部53、上昇斜面部54、平面部55（頂面）、段を経て平面部56（底面）、上昇斜面部57、平面部58、下降斜面部59、平面部60（底面）、上昇斜面部61、平面部62、段を経て平面部（底面）63と続いて元の斜面部51に戻る（後述する図5参照）。

【0017】つまり、第一カム12と第二カム17の摩擦状態で第一カム12の外周側凹凸部16と第二カムの外周側凹凸部23が圧接し、第一カムの内周側凹凸部15と第二カムの内周側凹凸部22が圧接することになる。従って前記第一カム12とこの第二カム17はそれぞれ回転軸に対し両側に凹凸部15、16、22、23があることから圧接状態で斜めになることがなく、軸に曲がりのかかる荷重が低減するため、スムーズに動作するとともに長寿命となる。

【0018】なお、第二カム17の外周部には抜け止め用のクリップ24が取り付けられる。抜け止めされれば良いのでこのクリップ24の代わりに既製品のEリングでも良い。

【0019】また、シャフト7の軸部9と反対側には外観を良くするためカバーキャップ25を配設したが、外観を気にしなければ無くても良い。

【0020】次に上記実施例の全体的動作（操作力の変動）について説明する。

【0021】図5から図7は、第一カム12と第二カム17の摩擦状態を示す展開図（上段が凹凸部16と23の摩擦状態、下段が凹凸部15と22の摩擦状態）であ

り、図5、図6、図7の順で回転角度が大きくなっている状態を示す。まず、図5に示す状態は回転部材2が固定部材1に対し折り畳み位置（回転角度が0度）をとる時の状態である。この折り畳み位置から回転部材2を回転角度が約10度開いた（回転した）位置までは、弾性部材11の付勢力と凹凸部22、23の上昇斜面部31、51により、0度の位置まで戻ろうとする力（閉じようとする力）が働く。

【0022】次に更に回転部材2を回転させていくと約120度回転する位置まで（図6の参照）平面部32、53が続くので弾性部材11の付勢力と両カム面の摩擦力は一定に推移する。つまり約10度から120度までは平面部32、52によりフリーストップで保持できる状態である。回転部材2が約120度回転するとカムは凹凸部15、16、22、23の山部に達し120度以上回転させようとするとカムの急な上昇斜面部33、53により相応な操作力を必要とするため約120度で例えば携帯電話における通話に必要な角度を保持することができる。

【0023】更に回転部材2を回転させていくと、各凹凸部15、16、22、23の山部の頂部に達し、やがて180度に達する。ここで凹凸部15、16、22、23を回転中心の対称形状に円周方向に重ならない位置に設けているので、回転角度が180度をこえても図7に示すように任意な荷重設定ができる。また、下降斜面部39、59に達すると、はね上げる力（開こうとする力）が働く。以上のように、本発明のヒンジ機構は①上昇斜面部31等による閉じようとする力、②平面部32等によるフリーストップで保持する力、③急激な上昇斜面部33等による必要な角度を保持する力（急激な上昇斜面部に代えて凹部を設けて必要な角度を保持しても良い）、④下降斜面部39等によるはね上げる力（開こうとする力）、これら全てに有効である。

【0024】なお、上記実施例において、凹凸部15、16、22、23は回転軸に対し対称形状で円周方向に重ならない位置に二重に設けたが、二重以上であれば良く、例えば三重に形成しても四重に形成しても良い。

【0025】また、上記実施例において第一カム12を固定部材1に設け、第二カム17を回転部材2に設けたが、相対的に回転すれば良いのであるから逆に配設しても良いことは言うまでもない。

【0026】

【発明の効果】本発明は、上記のように構成されているので、次に記載する効果を奏する。

【0027】請求項1の発明によれば、回転中心の対称形状の凹凸部を円周方向に重ならない位置に形成してカム面を構成したので、軸に曲がりのかかる荷重が低減できるため、寿命とスムーズ感があり、かつ固定部材に対する回転部材の回転角度が約180度をこえて任意な荷重設定ができるヒンジ機構を提供することができる。

【図面の簡単な説明】

【図1】 本発明実施例を示す分解斜視図である。

【図2】 本発明実施例を示す断面図である。

【図3】 本発明実施例の使用例を示す正面図である。

【図4】 本発明実施例の第二カムを示す平面図である。

【図5】 本発明実施例の回転角度が0度のカムの摩擦状態を示す展開図である。

【図6】 本発明実施例の回転角度が120度のカムの摩擦状態を示す展開図である。

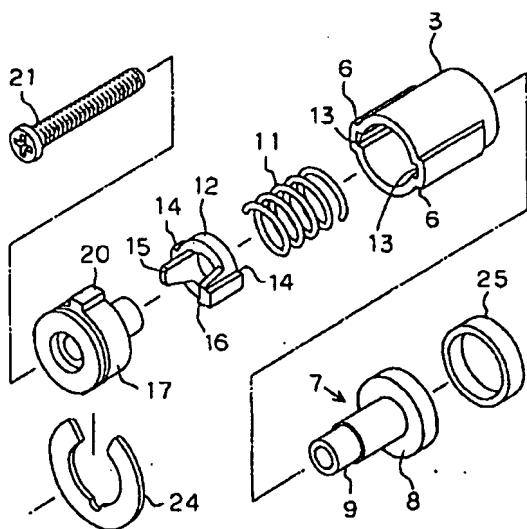
【図7】 本発明実施例の回転角度が230度のカムの摩擦状態を示す展開図である。

【図8】 従来例のカムの摩擦状態を示す展開図である。

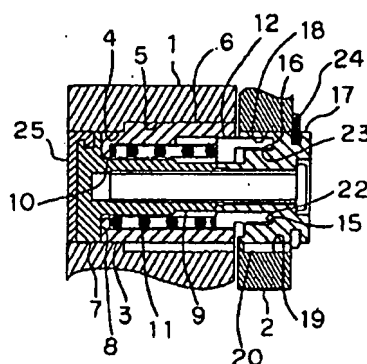
【符号の説明】

- 1 固定部材
- 2 回転部材
- 11 弾性部材
- 12 第一カム
- 15 凹凸部
- 16 凹凸部
- 17 第二カム
- 22 凹凸部
- 23 凹凸部

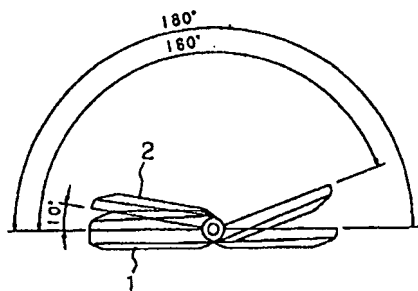
【図1】



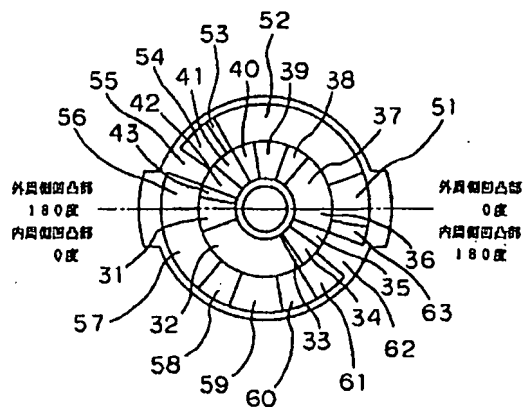
【図2】



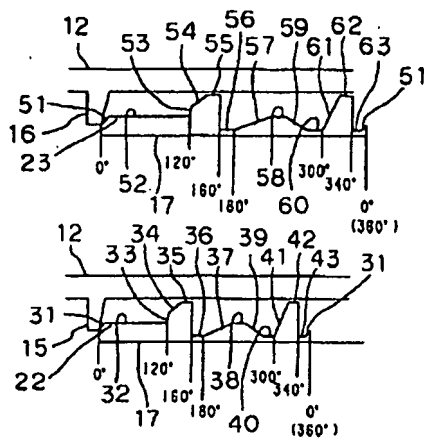
【図3】



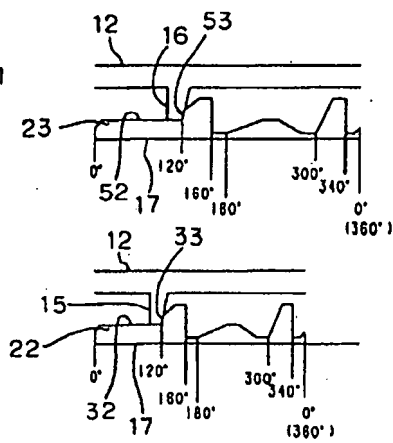
【図4】



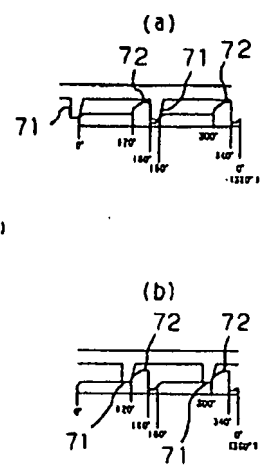
【図5】



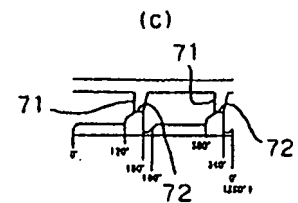
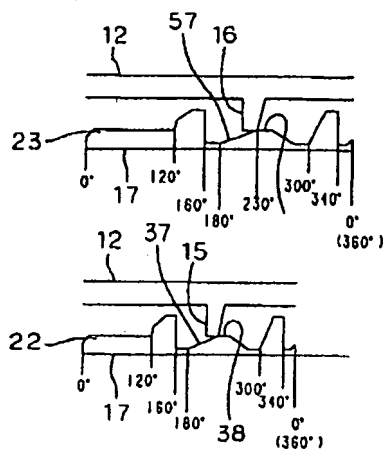
【図6】



【図8】



【図7】



フロントページの続き

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